

Because it does not provide for the union of water supply with drainage works—an union so essential to the due and secure action of both.

Because it does not place the managers of the works under any efficient control or responsibility, either to the public or to the public authorities. The shareholders of the company are to elect the directors, but the public must bear the loss of their mismanagement and extravagance.

Because it will impose on the public an amount of rate far greater than would pay for works adequate to supply the metropolis with the purest and the softest water.

Because the amount of compensation proposed to be awarded to existing waterworks companies is excessive.

The arbitrators who are to assess the amount are not instructed to take into consideration either the cost of constructing the works required *de novo*, or the extent to which new works are rendered necessary in consequence of the defaults of the present companies, or the degree to which the companies have failed to fulfil the obligations to the public which they have voluntarily undertaken.

Further they oppose it,—“Because it does not provide that the water to be supplied shall be the softest and purest procurable.”

Of course nothing will be done with the Bill this session: we doubt, indeed, if the government ever intended that it should pass, but threw it out simply to keep the matter alive. Such tubs, however, are very costly to the poor whale: a thousand pounds a day will probably scarcely pay the expenses of the recent inquiry and opposition. When it is again brought forward, the sewerage question should be united with it, and the public interest made the leading motive of the Bill.

Again and again we reiterate our conviction of the pressing importance of good sanitary arrangements; and we call upon all in their several provinces to aid in obtaining them, and thus lessen the sorrows, increase the happiness, elevate the mind, and lengthen the lives of their fellow-creatures and,—themselves.

ON THE ANCIENT ROMAN ROADS AND MODERN BRITISH RAILWAYS.*

I PURPOSE on this occasion to enumerate and describe those great works of the ancient Romans, with a view of comparing their magnitude with the cast-iron lines that now traverse a single province of the old Roman dominions. Unpromising as this subject may seem, it has already occupied the attention of archaeologists. Nicholas Berdier, the French antiquary, who died in 1823, has left two quarto volumes which he entitled “*Histoire des Grands Chemins de l’Empire Romain*.” Pratilli, a writer of the last century, has left a book on the Via Appia; and Volpi, in his work on Latium, treats of the roads which traversed that region. These learned writers, however, tell us nothing of the Macadam of those classic days, and never rise to the idea of a good turnpike-road, with our usual quantity of toll-bars. The Latin grammarians distinguish three different denominations of roads—Via, Actus, Iter. The Via answers to the French Route Royale, and was the great main road from one capital or province to another; such were called *Vie Consulares*. *Actus* we should call a bridle-road, about half the size and dignity of the Via, adapted for donkeys and bipeds; and *Iter* seems to be a general term for any path wide enough to travel upon. The office of taking care of the public roads devolved upon the *Curatores*, who appear to have had about the same power to inflict penalties for damages or trespasses, as our railway companies have to keep the third class in order. Some grand lines of road were planned and completed during the republic, but the earliest and most successful

road-makers of the empire were Julius Cæsar and M. Agrippa: of the latter Dion Cassius says, that when he was *Ædile*, in the year of the city 721, he restored all the roads without taking a penny from the public treasury. The Emperor Augustus, of whom it has been truly said that with all his power and might, he had neither a glass to his window nor a shirt to his back, was magnificent enough to make up the Flaminian way as far as Ariminum at his own expense, and ordered the senators to do the same to all the other roads at their expense: he made also the *Milliarium aureum*, of which I shall shortly say something, and on the occasion of this general repairing of all the roads that issued from Rome, medals were struck in commemoration of the same, with the superscription *Quod Via Munita sunt* (see medals Nos. 1 and 2, Nardini, vol. i.) Nero repaired all the roads in Spain, and I believe modern travellers in that country would like much to see him there again. Vespasian was a great restorer of the public Via, and Trajan’s restoration of the Via Appia is immortalised in sculpture. Marcus Antoninus undertook the roads in Germany and in Belgium, and the emperors in succession, however neglectful they might be in other matters, seldom got through their career without a little engineering in this line. Finally, Theodoric is the last of the men of power we read of who repaired roads in Italy. The devastating war of the Goths and Greeks put an end to all such useful enterprises, and the roads became for many centuries almost impracticable. The materials, torn up or pushed from their site, were used for erecting towers of defence, or walls to prevent incursions of barbarians, and not until civilisation began to dawn, did the highways receive any attention from the reigning powers of Italy.

I shall now say a few words upon the materials and construction of the *Vie Antiquæ*. Vitruvius does not disdain to give directions for making roads: he recommends that the engineer should choose solid ground and level it, and upon this lay his first covering; and that if there be any looseness in the soil, he must consolidate it by means of wooden piles—“*Fistucationibus cum magnâ curâ solidetur*.” We should hardly imagine that this is a subject for poetry, but yet it is from a passage in the Poet Statius, that we chiefly learn how a road was commenced. First they cut two parallel furrows, to indicate the width of the road, and then they cut down between these until they came to the hard bottom, and then began the levelling. As the construction proceeded, the road assumed a slight convex shape: the middle or top was called the *dorsum*, or back-bone of the way; or, as it is called in Virgil, “*in agere via*”: roads that were left in the rough material were said to be *munitæ*, but when covered with cut polygonal blocks, it was a “*via strata*,” from whence is derived the Italian *strada*. Specimens of this “*opus stratum*” are still existing on the Via Ostiensis and the Via Appia, in the neighbourhood of Rome, but a piece in the best preservation is on the Via Albana, the triumphal way that led up to the temple of Jupiter Latiaris, on the Alban Mount; the letters V.N., Via Numinis, may still be read upon this pavement, which has kept its place for near 2,000 years. All these remains, and many others that might be enumerated about the hills of Frascati, Praeneste, and Tivoli, are of the same description, being composed of large polygonal blocks of basaltic lava, found in many places near Rome, particularly in the quarries near the Lake Regillus, under the Capuchin convent, near Bovillæ, also near the sepulchre of Cecilia Metella. This sort of stone was called by the ancient Romans *silex*, or *lapis siliceus*, and the places where it was got were called *lapidiciniæ silicæ*: it will be sufficient to offer for your inspection some specimens of this material, which I gathered with my own hands in Italy. The Roman Via were edged by a step on each side: these were called *crepidines*, *marginæ*, or *umbones*: they were about 9 inches in elevation. The other materials used in roads were a mixture of broken fragments of all sorts, called “*rudus*,” which we should call in plain English rubbish; *terra cotta*, called *testa*;

and that most plentiful of materials used in all the works of Rome, tufo. I also offer some specimens of that article taken from the quarries described by Vitruvius, near Rome. I shall shortly present you with a description of a Roman road quite finished, when the rudus, and the testa, and the calx, and the tufo, consolidated with the fistucationes, have been polished off by the stratification of basaltic lava. The Roman roads issuing from the gates of Rome, or branching out in the immediate neighbourhood, were twenty-nine in number: they were measured by a thousand paces, *Mille Passuum*, which is the origin of the word “mile,” and short round pillars, called *milliaria*, marked the distances from each gate. In the forum there was set up a pillar, on which were inscribed the distances from Rome to each city, where the roads respectively had their terminus. The distances were not measured, as has been erroneously supposed, from this pillar or golden *milliarium*, but they were measured from the gates. This fact of the distances being measured from the gates, is ascertained by the first *milliarium* on the Via Appia having been found in its place in the Vigna Nari, on the right of the St. Sebastian gate, and the distance of a 1,000 paces being measured by Fabretti towards Rome, was found to coincide with the ancient site of the Porta Capena. There are three ancient itineraries which have come down to us enumerating, like a modern *Livre de Poste*, the various roads and distances from place to place. The first is commonly called the Itinerary of Antoninus, because it was made and published during the peaceful reign of the Antonines, the golden period of the Roman empire. During those forty years of peace and good government, the arts and useful public works were encouraged; and it is one of the blessings upon which we may congratulate the profession of architectural science and art, that it flourishes best in the atmosphere of peace and good will on earth. The second Itinerary was discovered at Augusta (Aost), in the possession of a certain Conrad Peutinger, and is known under the name of the Carta Peutingeriana: it is evidently of Christian times, mention being made of St. Peter’s Church: the orthography betrays the corrupted language of the eighth century, but notwithstanding these defects of composition and spelling, it is a precious document, and unique of its kind, being the only one that affords us the least information of the state of the world at that period. The third of these ancient itineraries was found at Bordeaux; it describes the journey from that city to Jerusalem, and is known on that account under the title of the Jerusalem Itinerary: it appears to be of about the same date as the Carta Peutingeriana. These are the three documents from which is to be gathered all that can be known of the public roads of the Roman empire. The two ancient *Vie* best known to the present world, are the Via Flaminia, by which travellers from the north enter Rome, and the Via Appia by which they leave it to travel to Naples. The Via Aurelia, which led to Centum Cellæ, now Civita Vecchia, has recently acquired a celebrity which it never enjoyed in ancient times.

The Via Flaminia, however, does not proceed in the direction of the modern road to Florence beyond the Ponte Molle; after passing that bridge, which is two miles from the gate, the post-road falls in with the Via Cassia, and the Via Flaminia leads into solitudes and Mount Soracte. This celebrated Roman road was constructed by Caius Flaminius, the unfortunate consul, who fell at the battle of Thrasimene: at that time the Flaminian gate was at the upper end of the Corso, under the Capitoline Hill, so that it was always reckoned as Pontem III. The Via runs through the Campus Martius; it ended at Ariminum, now Rimini, a distance of 222 miles; it passed through Narni, Terni, Spoleto, before it cut through the Apennines to reach Piæro, and in some places, especially between the Ponte Molle and Soracte, considerable remains of it may be traced. The road which I shall seek now to describe, and make the object of comparison, is the Via

* Read by the Rev. R. Burges, R.D., at the Ordinary General Meeting of the Royal Institution of British Architects, June 30, 1851.